



## Bio-Medical

### Virtual Ultrasound Guidance for Inexperienced Operators

**This audio/video system provides real-time help to inexperienced ultrasound operators in remote environments.**

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Medical ultrasound or echocardiographic studies are highly operator-dependent and generally require lengthy training and internship to perfect. To obtain quality echocardiographic images in remote environments, such as on-orbit, remote guidance of studies has been employed. This technique involves minimal training for the user, coupled with remote guidance from an expert. When real-time communication or expert guidance is not available, a more autonomous system of guiding an inexperienced operator through an ultrasound study is needed. One example would be missions beyond low Earth orbit, in which the time delay inherent with communication will make remote guidance impractical.

The Virtual Ultrasound Guidance system is a combination of hardware and software. The hardware portion includes, but is not limited to, video glasses that allow hands-free, full-screen

viewing. The glasses also allow the operator a substantial field of view below the glasses to view and operate the ultrasound system. The software is a comprehensive video program designed to guide an inexperienced operator through a detailed ultrasound or echocardiographic study without extensive training or guidance from the ground. The program contains a detailed description using video and audio to demonstrate equipment controls, ergonomics of scanning, study protocol, and scanning guidance, including recovery from sub-optimal images.

The components used in the initial validation of the system include an Apple iPod Classic third-generation as the video source, and Myvue video glasses. Initially, the program prompts the operator to power-up the ultrasound and position the patient. The operator would put on the video glasses and attach them to the video source.

After turning on both devices and the ultrasound system, the audio-video guidance would then instruct on patient positioning and scanning techniques.

A detailed scanning protocol follows with descriptions and reference video of each view along with advice on technique. The program also instructs the operator regarding the types of images to store and how to overcome pitfalls in scanning. Images can be forwarded to the ground or other site when convenient. Following study completion, the video glasses, video source, and ultrasound system are powered down and stored. Virtually any equipment that can play back video can be used to play back the program. This includes a DVD player, personal computer, and some MP3 players.

*This work was done by Timothy Caine and David Martin of Johnson Space Center. Further information is contained in a TSP (see page 1). MSC-24800-1*